two). For patients receiving anticoagulants with cloth-covered aortic prosthetic valves, the actuarial incidence of embolism is zero at five years compared with 18 percent with non-cloth-covered valves (Model 1200-1260). In terms of embolism per 1,000 patient-years of follow-up, there were four episodes for non-cloth-covered prosthetic valves, and ten episodes for cloth-covered in patients not receiving anticoagulant therapy. There were no episodes in 116 patients receiving anticoagulants who had a cloth-covered aortic prosthetic valve in place.

The actuarial incidence of infection is less than 4 percent at five years with cloth-covered valves. Specific complications, such as hemolytic anemia due to cloth tear have produced an actuarial reoperation rate of 8 percent at five years. However, current models of cloth-covered valves containing a track on the inner surface of each strut are free from this complication.

While our computerized review of aortic valve patients is not yet complete, cardiac mass and ventricular function appear to be the important determinants of the quality of life and functional classification after operation. On this basis it is our current policy to recommend valve replacement in Class I patients if there is a striking progression in cardiomegaly in presence of aortic regurgitation.

While medical considerations must play the dominant role in determining the timing of operation for chronic valvular heart disease, we must also consider the chance for social and economic rehabilitation. It has been our experience that patients who have been off work for more than six months before operation have a very poor chance of returning to work postoperatively, even if they have had an excellent physiological result.

Thus, we find ourselves in essential agreement with Carey and his associates. Cardiac valve replacement must be considered earlier in the course of the patient's disease in order to prevent the development of irreversible heart disease. Exactly how early this should be is the problem to be answered by each of us depending upon a balancing of the risks, both early and late, with each patient. The trend toward earlier operation is definitely here, and how far we extend it will depend upon a continuing analysis of the results we achieve.

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WAMI

THE DESIRABILITY of better distribution of health manpower and particularly of physician manpower to underserved areas is widely accepted. Yet the most important action is where there is some density of physicians, other health manpower and health care resources. Many knowledgeable observers feel that there has been and still may be an overall physician shortage. And these are times when an unprecedented number of young Americans are seeking to become physicians, and an unprecedented number of foreign medical graduates are being admitted to this country and given licenses to practice here. And while medical educators are under increasing political pressure to provide educational opportunities for foreign medical graduates, they find themselves without the wherewithal to offer qualified Americans the opportunity to become physicians whether or not they come from medically underserved areas or cultures.

It is against this rather schizophrenic background that a variety of attempts are being made to strengthen health manpower and health care services in deprived or underserved areas. In those instances where major medical centers with a full complement of physicians and resources find themselves in or adjacent to major underserved areas, the effort has often been to develop models for health care delivery in these areas. This has occurred in Boston, Baltimore and Chicago, for example. There have also been delivery models developed in areas quite remote from major medical centers, but these seem to thrive best when they can somehow tap into the resources of a major medical center. Another, quite different and very important approach has been to decentralize medical and health care education to underserved areas. This has the advantage of bringing the educational processes to where the practice needs are and allows improvements in the distribution of health manpower and health care services to flow from this. This approach was pioneered on a national scale by Regional Medical Programs, which emphasized transferring the knowledge

which had been accumulating in the major health science centers out to where the underserved needs were, and some decentralized training of health manpower was a by-product of this. More recently Area Health Education Centers in the model of the Carnegie Report are being tried in several areas of the nation. In this model, major health science centers undertake to carry out training programs for interns and residents in primary care specialties and clinical training for medical students in underserved areas in the expectation of attracting physician manpower to the area and of improving both the quantity and the quality of the services. This model is now being tested, and how successful it will be is not yet known. It is worth noting in passing that in each of these approaches a major health science center, often a university medical center, seems to play a significant if not an essential role.

As reported elsewhere in this issue, the states of Washington, Alaska, Montana and Idaho (WAMI) have now banded together in yet another experiment in bringing medical education to underserved areas. In this model the University of Washington School of Medicine plays the central role and ways have been found to conduct both preclinical and clinical instruction of medical students in underserved areas, yet under the aegis and supervision of the medical school. As the program gets underway it should serve effectively to decentralize a number of aspects of medical education, and so permit a larger number of students to be enrolled. It also should upgrade the quality of care in underserved areas and make practice there more attractive to physicians. And it will certainly provide a better opportunity for young Americans in these areas to embark on a career in medicine. If the program succeeds, the University of Washington will have taken another pioneering step not only in medical education but in identifying a role for a university medical center in helping to overcome some of the problems of physician distribution in underserved areas.

The WAMI project will be watched with interest.

—MSMW

Myelomeningocele

REVOLUTIONARY CHANGES have occurred in the management of myelomeningocele during the past 15 years. This disease is the second most common chronic disabling condition of childhood, occurring with a frequency of about 1 per 800 births. The current concepts and therapeutic recommendations of a group active in this field are presented in this issue.

Basic to rational treatment of any disease is an understanding of its cause, mechanisms and natural history. The cause of myelomeningocele is unknown although it is clearly linked to other neural tube defects and has a familial incidence with about a 5 percent recurrence risk. Studies suggesting a causative link with potato virus need further confirmation.[1]

The embryologic insult occurs early in gestation, probably between the 21st and 28th days and is characterized by leakage of spinal fluid and a discrepancy between growth of mesodermal and ectodermal tissue. If spinal fluid leaks into the amniotic fluid it is detectable by the presence of alpha-fetoprotein. Amniocentesis is recommended for mothers known to be "at risk."[2] A further important concept sometimes not well appreciated is that the neurological lesion is not simply a lower motor neuron lesion. Rather, isolated cord segments may exist producing a mixture of spasticity and flaccidity which affect not only the peripheral muscles but the bladder as well.

Before present-day treatment programs, disability was severe and long-term survival was rare. It remains true that chances for survival past the intrauterine period are limited but the rate of survival from birth to age two is now around 60 percent. Considering the multiple handicaps and hazards of surgical operation and sepsis, this is a remarkable achievement. These children face odds of hydrocephalus in about 75 percent of cases, severe retardation in about 10 percent, urinary tract infection in most and variable degrees of motor dysfunction in nearly all.

Perhaps the most controversial issue in treatment has been whether to do immediate closure or delay this procedure.[3,4] The case for closure within the first 24 hours to prevent further neuro-